Lighting: Daylighting Controls

Description

This change revises daylighting controls for large, single zone spaces. It requires automatic daylight dimming (continuous or stepped) in large spaces having daylit zones, and requires a minimum of two manual light levels and distributions in smaller spaces.

Benefits

This measure would ensure that daylighting control is installed to properly accommodate classrooms and other large daylit zones.

Environmental Impact

This measure can save up to 50% of the energy normally used in large, single daylight zone spaces.

Type of Change

This would be a mandatory measure. The Nonresidential Manual would address its application.

Measure Availability and Cost

Automatic daylighting controls are currently somewhat expensive. A classroom system presently costs between $1,000 and $2,000, including dimming ballasts. Equipment is readily available from multiple manufacturers.

Useful Life, Persistence and Maintenance

The power savings and benefits of this measure are well established and have been promoted by the *Advanced Lighting Guidelines* since 1990. The largest unknown is the calibration and performance of automatic daylight dimming systems and their associated controls.

Performance Verification

Photocell controls require careful calibration and maintenance in order to achieve lasting energy savings. This measure should be accompanied by performance verification requirements.

Cost Effectiveness

This requirement will be shown to be cost effective in subsequent tasks. This measure will increase the cost of construction by about $1.50 per square foot, on average. It will permit the reduction of power by 0.6 W/ft² on average, resulting in demand savings as well as kWh savings. The critical analysis is the relative cost of dimming ballast equipment, which will be needed to implement this requirement.

Analysis Tools

The reference method for nonresidential buildings, DOE-2, has the capability to model daylighting in spaces. This tool can be used for both compliance calculations and for cost effectiveness calculations. Other daylighting tools provide a detailed, point-by-point lighting assessment for an instant in time. These include LumenMicro, Radiance and LightScape.

Relationship to Other Measures

This measure will be coordinated with other lighting control measures and the revised definition of daylit area.

Bibliography and Other Research

The veracity of this idea is supported by the *Advanced Lighting Guidelines*. Costs were determined during work on the Collaborative for High Performance Schools (CHPS) project